

# ON SOME SPECIES OF *CYCLOPS* AND OTHER ENTOMOSTRACA COLLECTED BY DR. J. M. DALZIEL IN NORTHERN NIGERIA

BY

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*(Received for publication 21 June, 1910)*

## PLATES XVIII-XX

The species here described were collected by Dr. Dalziel at Yola in Northern Nigeria, in the course of a research on the Life History of the Guinea Worm. The specimens were sent to me for description by Mr. J. H. Ashworth, of the Zoological Department of Edinburgh University, and examples, as far as possible, of the various species have been sent to the University for future reference. Some few types are, however, unavoidably absent. Dr. Dalziel made careful notes of the various localities from which his specimens were taken, which I here transcribe. The sources of each particular species are indicated by the letters affixed to the descriptions.

*Sources.*

A. Turbid bush-pools with muddy bottom, frequented by cattle and containing fish.

B. Surface-well in clay, free from water plants, but with grass and weeds dipping down the sides to the water's edge.

C. Marshes or pools of clear water when undisturbed; bottom of mud or of grass coated with sediment; containing *Lemna*, *Nymphaea* and other water plants, and fringed with rank grass.

D. Small pools of clear water in shrinking bed of River Benué, recently isolated and therefore not long stagnant, and containing flocculent viscid algae, insect larvae, etc.

E. Benué River, small bays and backwaters of clear water but no current, sandy edges and bottom with some vegetable debris and sediment, but no growing vegetation.

It may be useful to future workers in this field to note here some of the points which need special attention in determining the various species of *Cyclops*.

1. The number of joints in the anterior antennae and the length of the limb relatively to the body of the animal.
2. The numbers of joints in the rami of the four pairs of natatory feet.
3. The characters of the rudimentary fifth pair of feet.
4. The characters and proportional length of the caudal rami.

The general outline of the body and its various segments should be noted, and in living specimens the colours of the body and egg-sacs may provide useful characters.

Dr. Dalziel's attention seems to have been almost entirely directed to the Cyclopidae as being probably the intermediate bearers of human parasites, but it is quite likely that these hosts might also be found among the Ostracoda. In two, at least, of the British species of that group I have myself found scolices of an undetermined species of *Taenia*, and in yet another Ostracod many specimens of a larval Trematode worm, as well as a fully developed worm belonging to the group *Acanthocephala*. A brief reference to these may be found in my paper on the British species of *Candoninae*. (Proceedings of the Zoological Society of London, 1910, Part 1.)

#### COPEPODA

*Clycops nigeriae*, n. sp. Plate XVIII, figs. 1-7.

*Female*, length 0.88 mm. Body robust (fig. 1), cephalic segment as broad as long, rounded and slightly produced in front; the two following segments expanded laterally and obtusely angulated behind; last thoracic segment very small; urosome rather short and stout, about one-third as long as the anterior portion of the body; genital segment moderately dilated; caudal rami as long as the united lengths of the last two segments, slightly tapering distally, seta of the outer margin attached rather behind the middle, apical setae long, the innermost considerably longer than the entire urosome (fig. 3). Anterior antennae (fig. 4) eleven-jointed, reaching when reflexed to the middle of the second body-segment, rather sparingly clothed with setae of moderate length. Natatory feet short and

stout, with both rami bi-articulate (fig. 6); last pair of feet two-jointed (fig. 2), the basal joint short and not very distinct, apical joint slender, bearing two long setae, the distal one being needle-shaped. Colour stated by Dr. Dalziel to be 'greyish green, eye, deep red.' The general characters of this species are very similar to those of *C. gracilis*, Lilljiborg, and *C. bicolor*, G. O. Sars, and the natatory feet are not unlike those of *C. pachycomus*, one of the many species described by the latter author from Lake Tanganyika.

Dr. Dalziel's specimens are from several different sources. The species would seem to be generally distributed in the region investigated by him. Sources A. B. C. D. E.

*Cyclops virescens*, G. S. Brady. Plate XVIII, figs. 8-16.

*Female*, length 0.65 mm. Body slender, the anterior segment ovoid in form, and scarcely at all produced in front (fig. 8), the other thoracic segments not expanded laterally, last segment short (fig. 10); urosome slender, genital segment equal in length to the two following segments, scarcely at all dilated (fig. 10), caudal rami short, about equal in length to the last tail segment, not at all divergent. Anterior antennae (fig. 9), eleven-jointed, reaching when reflexed to the posterior border of the third body segment, slender and sparingly setiferous; natatory feet (figs. 11, 15, 16), with both branches three-jointed; fifth pair of feet uni-articulate and bearing two apical setae (fig. 14). First segment of the urosome in the *male* produced ventrally into a slender spine (fig. 13).

This, like the preceding species, occurred in various gatherings, and Dr. Dalziel's notes assign to it a wide range of colour, from yellow to green and brown. Sources A. B. C. D. E.

There can, I think, be little doubt as to identifying Dr. Dalziel's specimens with those already imperfectly described by me from Dr. Graham's collection under the specific name of *virescens*. Dr. Graham's notes, made from an examination of freshly gathered specimens, assign ten joints to the anterior antennae, whereas the number of joints in Dr. Dalziel's specimens is, so far as I can make out, eleven. But the jointing, as seen in spirit-specimens, is very indistinct, and in any case the slight difference might possibly depend upon the age of the animals. In all other respects the two forms agree with each other.

I am indebted to Dr. Calman, of the British Museum, for the oppor-

tunity of examining the type specimens of *C. virescens*, and it is on this that the foregoing remarks are based.

*Cyclops longistylis*?, G. S. Brady. Plate XIX, figs. 17-23.

*Cyclops longistylis*, Brady. Notes on Dr. Graham's collection of Cyclopidae. (Annals of Tropical Medicine and Parasitology, Vol. 1, No. 3, 1907.)

Female, length 0.77 mm. Body slender, tapering gradually from before backwards (fig. 17), first segment longer than broad, sub-ovoid, the three following segments scarcely at all produced laterally, last thoracic segment very small; urosome slender, genital segment not at all tumid, caudal rami very slender, about six times as long as broad, scarcely divergent; anterior antennae ten-jointed, when reflexed somewhat shorter than the first body segment (fig. 22). All the natatory feet have both branches three-jointed; feet of the fifth pair very minute, almost obsolete, bi-articulate (fig. 23), the first joint bearing two setae, the distal joint one seta; attached to this pedigerous segment just in front of the foot are three rather strong setae—longer than the foot itself. The spines of the second and third pairs of feet are in the *male* unusually strong (fig. 19), those of the fourth pair not quite so strong, and those of the first pair almost normal (fig. 20).

The specimens here described were found in Dr. Dalziel's gatherings from the Benué River (Source E), 'colour dark green or greenish-yellow, the egg masses brown, carried close to the body.'

The reference of these to *C. longistylis* is somewhat doubtful, and the type-specimens being now in the British Museum—very few in number, and in an imperfect condition—I am unable to verify the reference. The principal doubt arises from a discrepancy in the recognisable number of joints in the anterior antennae, Dr. Graham's record of twelve joints disagreeing with my own observation of ten joints only in Dr. Dalziel's specimens. But these details are not easily observed in spirit-specimens, and need not be absolutely insisted on.

*Cyclops leuckarti*, Claus. Sources A. B. C. D. E.

*Cyclops bicolor*, G. O. Sars. Sources A. C.

*Cyclops brevipes*, n. sp. Plate XX, figs. 31-34.

Female, length 0.55 mm. Body slender (fig. 31), the first segment occupying not much less than half of its entire length, rounded

and somewhat narrowed in front, the hinder segments not expanded laterally; urosome slender (fig. 33), the genital segment not dilated and scarcely longer than the next following segment, the first two segments armed with spine-like setae on their distal outer angles, last segment having its distal margin finely aculeate; caudal rami rather longer than the last abdominal segment; setae of the outer margin attached near the middle; apical setae of moderate length. Anterior antennae (fig. 34) eight-jointed, barely half as long as the first segment of the body, sparingly beset with short setae. Natatory feet short, having both rami two-jointed (fig. 34); the place of the fifth pair occupied by two short setae.

This species occurred in the same localities as those recorded for *C. nigeriae*. It is the smallest which has ever come under my notice. The characters of the urosome and anterior antennae sufficiently distinguish it from any other form.

*Diaptomus nigerianus*, n. sp. Plate XIX, figs. 24-30.

*Female*, length 1.1 mm. Anterior division of the body rather slender, of nearly equal width throughout, the posterior segment somewhat produced laterally and sharply angulated (fig. 28); urosome (fig. 25) slender, the genital segment not at all protuberant in front, the last two segments together scarcely half as long as the genital segment, and very imperfectly separated from each other; caudal rami dilated distally, scarcely as long as the two anterior coalescent segments, terminal setae broad, sub-spathulate and rather densely plumose, about twice as long as the rami themselves (fig. 25). Anterior antennae slender, scarcely exceeding the entire length of the body; posterior maxillipeds of the usual form, the distal joint exceedingly small (fig. 26); inner ramus of the last pair of legs (fig. 27) simple, much shorter than the first joint of the outer ramus; claw of the outer ramus stout, non-ciliated, terminal joint indistinct.

*Male*, last segment of the cephalothorax rounded off posteriorly; abdomen narrow, five-jointed; penultimate joint of the right anterior antenna bearing an apical spine, which is shorter than the next following joint (fig. 24); outer branch of the last pair of legs (fig. 30) of the right side simple, the last joint bearing an apical simply-curved claw, and on the outer margin a small papilla and a slender curved spine; the basal joint of the foot of the left side is



produced internally into a short digitiform process or rudimentary inner branch; the outer ramus short, bi-articulate, the last joint bearing a small setiferous papilla. The protopodite bears on its distal margin a couple of papilliform processes which overlap slightly the basal joint of the limb. The tail setae of the male are much more slender than those of the opposite sex, and are non-plumose.

This species seems to be more nearly allied to *D. galeboides*, G. O. Sars, than to any other described species, though whether that form be really specifically distinct from *D. galebi* of Mrázek may perhaps be doubted. The types of *D. galebi* were taken in Egypt, those of *D. galeboides* in Lake Tanganyika.

Dr. Dalziel's specimens, here described, are from 'a rocky pool of a hill-stream, 7. 11. 09.'

#### OSTRACODA

*Cypris subovata*, n. sp. Plate XX, figs. 35-39.

Shell subovate, tumid; seen from the side subreniform, highest in the middle, height more than equal to half the length, extremities well rounded, the anterior being the narrower of the two, dorsal margin gently arched, ventral slightly sinuated in the middle (fig. 35); seen dorsally the outline is ovate, tumid, greatest width behind the middle and equal to considerably more than half the length (fig. 36), extremities obtusely pointed, the left valve larger than the right and distinctly overlapping in front; shell surface smooth, clothed at the extremities with fine hairs. Length 0.77 mm. Setae of the posterior antennae reaching beyond the apices of the terminal claws. Caudal rami slender (fig. 37), their terminal claws simple, only slightly curved, the marginal seta short, attached near the distal end of the limb about one-fourth of its length from the apex. Sources A. D.

*Cypridopsis circinata*, n. sp. Plate XX, figs. 40, 41.

Shell very tumid, sub-spherical; seen from the side sub-ovate, gibbous, greatest height situated in the middle, and equal to about three-fourths of the length, extremities very broadly rounded, dorsal margin boldly arched, gibbous in the middle, ventral slightly convex

(fig. 41); seen from above broadly elliptical, widest in the middle, width equal to two-thirds of the length, extremities evenly rounded off, lateral margins boldly and evenly arched, right valve slightly larger than the left (fig. 40). Caudal rami very small; only imperfectly seen. Shell-surface smooth, without sculpture of any kind, but densely clothed with short hairs. Length 0.65 mm. Dr. Dalziel's collection contained only one example of this species, taken in one of the two localities given for *Cypris subovata*.

#### CLADOCERA

*Simocephalus*, sp.

*Diaphanosoma leuchtenbergianum*? S. Fischer. Both of these from Sources A. B. C. D.

## EXPLANATION OF PLATES

## PLATE XVIII

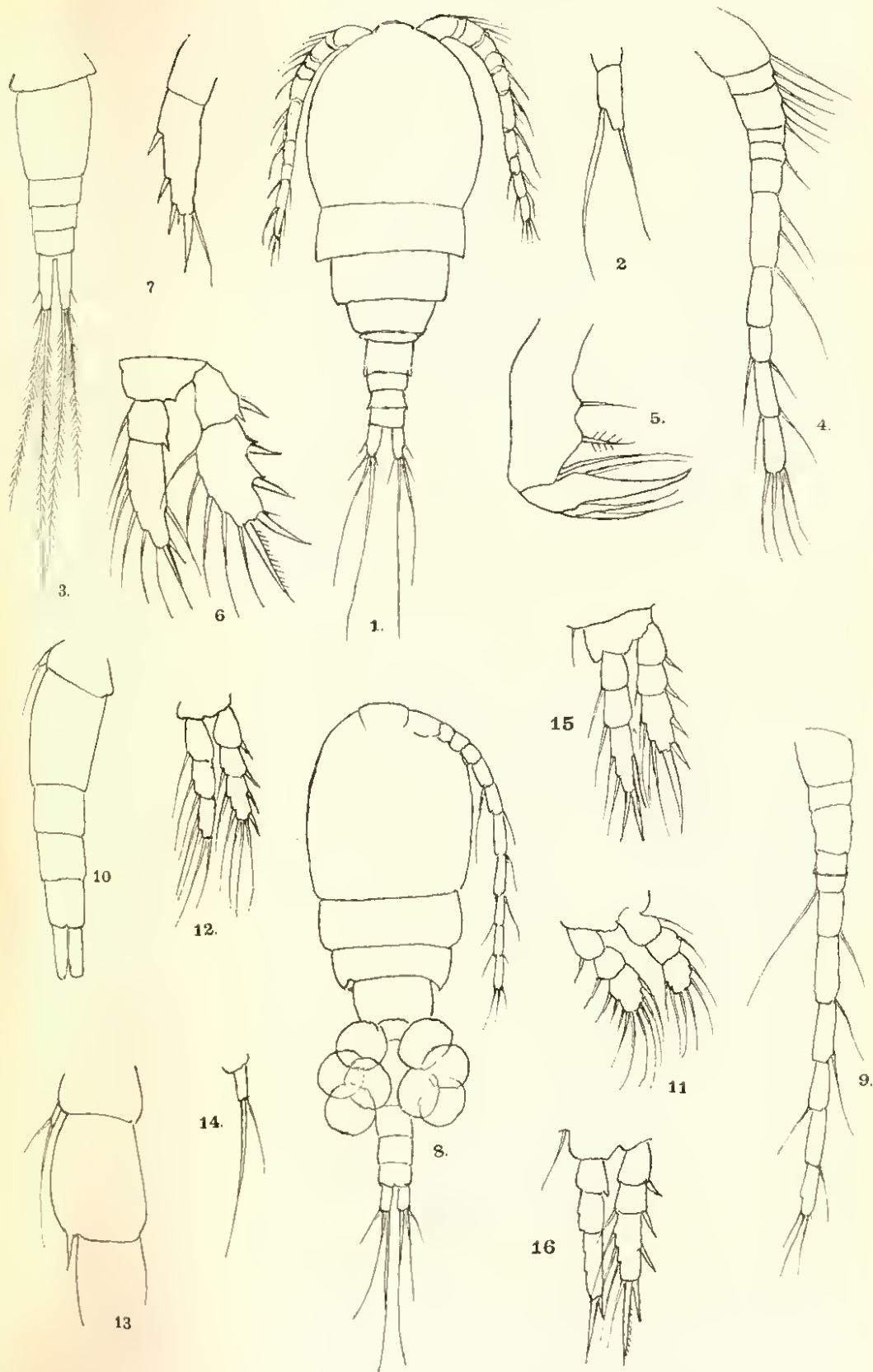
*Cyclops nigeriae* ♀

- Fig. 1. Female seen dorsally.  $\times 84$ .  
 Fig. 2. Foot of fifth pair.  $\times 440$ .  
 Fig. 3. Urosome.  $\times 160$ .  
 Fig. 4. Anterior antenna.  $\times 160$ .  
 Fig. 5. Posterior footjaw.  $\times 240$ .  
 Fig. 6. One of the swimming feet.  $\times 180$ .  
 Fig. 7. Outer branch of third pair (?).  $\times 180$ .

*Cyclops virescens* ♀

- Fig. 8. Female seen ventrally.  $\times 120$ .  
 Fig. 9. Anterior antenna.  $\times 240$ .  
 Fig. 10. Urosome and last thoracic segment.  $\times 240$ .  
 Fig. 11. Foot of first pair.  $\times 320$ .  
 Fig. 12, 15, 16. Foot of second, third and fourth pairs.  $\times 240$ .  
 Fig. 14. Foot of fifth pair.  $\times 440$ .  
 Fig. 13. Last thoracic segment and first segment of urosome of male.  $\times 240$ .





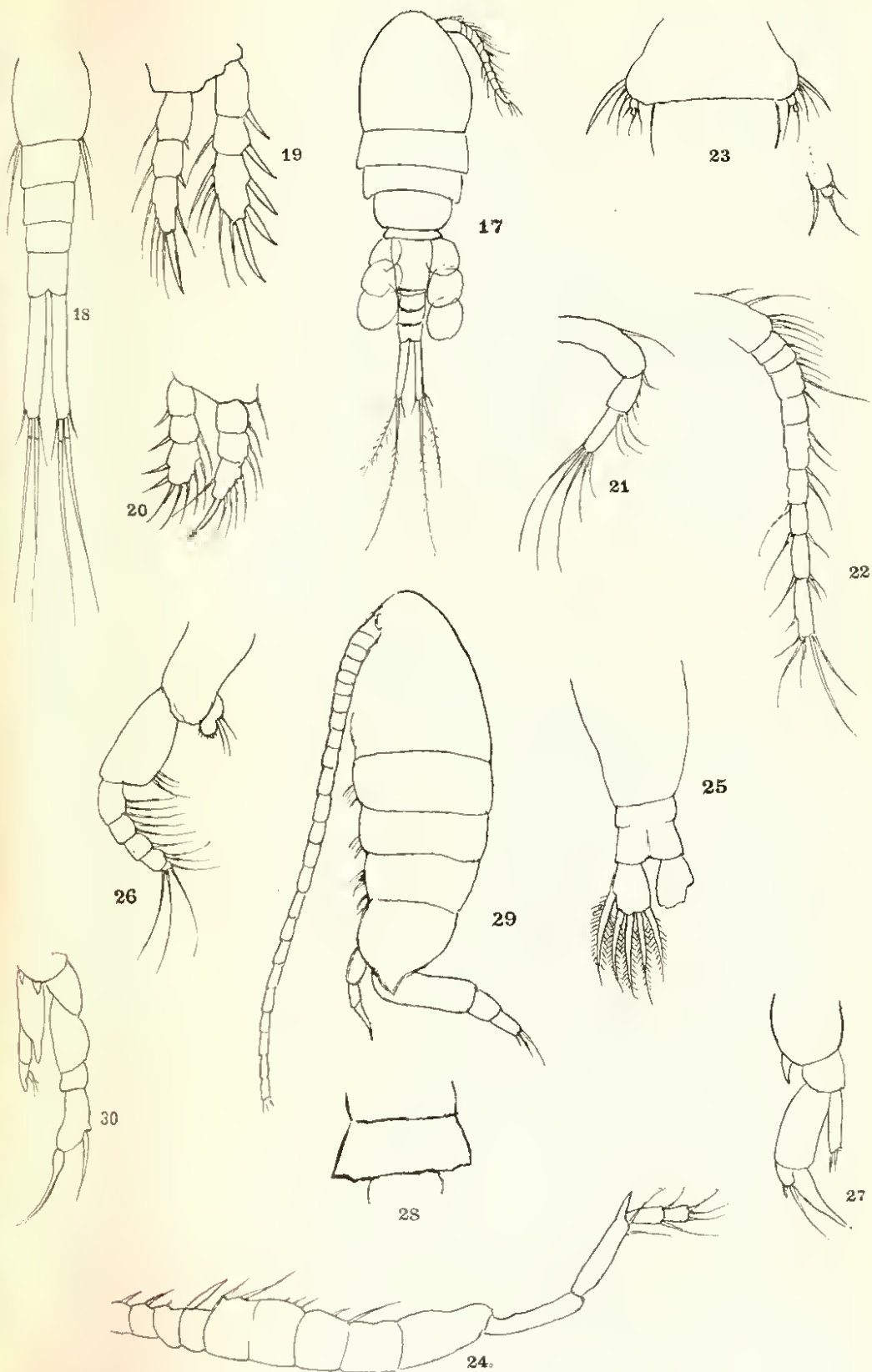
## PLATE XIX

*Cyclops longistylis* ?

- Fig. 17. Female seen dorsally.  $\times 84$ .  
Fig. 18. Urosome.  $\times 180$ .  
Fig. 19. Foot of fourth pair, male.  $\times 240$ .  
Fig. 20. Foot of first pair.  $\times 240$ .  
Fig. 21. Posterior antenna.  $\times 240$ .  
Fig. 22. Anterior antenna.  $\times 240$ .  
Fig. 23. Last thoracic segment and fifth pair of feet.  $\times 300$ .

*Diaptomus nigerianus*

- Fig. 24. Part of anterior antenna of male.  $\times 140$ .  
Fig. 25. Urosome of female.  $\times 140$ .  
Fig. 26. Posterior maxilliped.  $\times 140$ .  
Fig. 27. Foot of fifth pair, female.  $\times 180$ .  
Fig. 28. Last thoracic segment, female.  $\times 140$ .  
Fig. 29. Female seen laterally.  $\times 65$ .  
Fig. 30. Fifth pair of feet of male.  $\times 140$ .



## PLATE XX

*Cyclops brevipes* ♀

- Fig. 31. Female seen dorsally.  $\times 100$ .  
Fig. 32. Foot of first pair.  $\times 350$ .  
Fig. 33. Urosome.  $\times 300$ .  
Fig. 34. Anterior antenna.  $\times 350$ .

*Cypris subovata*

- Fig. 35. Shell seen from left side.  $\times 65$ .  
Fig. 36. Shell seen from below.  $\times 65$ .  
Fig. 37. Caudal ramus.  $\times 150$ .  
Fig. 38. Extremity of foot of last pair.  $\times 150$ .  
Fig. 39. Posterior maxilla.  $\times 240$ .

*Cypridopsis circinata*

- Fig. 40. Shell seen dorsally.  $\times 84$ .  
Fig. 41. Shell seen from right side.  $\times 84$ .

